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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/841,580	04/24/2001	Andrea Califano	YOR920000687US2	5406
48062 7590 06/05/2008 RYAN, MASON & LEWIS, LLP 1300 POST ROAD SUITE 205 FAIRFIELD, CT 06824				
EXAMINER				
CLOW, LORI A				
ART UNIT		PAPER NUMBER		
1631				
MAIL DATE		DELIVERY MODE		
06/05/2008		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

09/841,580

Applicant(s)

CALIFANO ET AL.

Examiner

Lori A. Clow, Ph.D.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 March 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3, 17-19, 23-25 and 29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 17-19, 23-25 and 29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/C)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date _____

DETAILED ACTION

Applicants' response, filed 5 March 2008, has been fully considered. Rejections and/or objections not reiterated from previous office actions are hereby withdrawn. The following rejections and/or objections are either reiterated or newly applied. They constitute the complete set presently being applied to the instant application.

Claims 1-3, 17-19, 23-25 and 29 are currently pending. Claims 4-16, 20-22, and 26-28 have been cancelled.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1, 2, 4, 7-9, 12, 13, 15, 18-20, 23, 24, 26, 29-31, 34, 35, 37, 40-42, and 45-48 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. *This is a new ground of rejection.*

Claims 1 is drawn to a method for characterizing gene expression comprising steps that do not include a physical transformation of matter.

As emphasized by the New Interim Guidelines the claims will be evaluated for providing a practical application. A practical application is claimed if the claimed invention physically transforms an article or physical object to a different state or thing, or if the claimed invention otherwise produces a concrete, tangible, and useful result. In the instant case, a physical transformation of matter is not provided, as the instant claims merely encompass non-physical

(i.e. *in-silico*) method steps, such as determining a plurality of gene expression signals, transforming data, determining patterns from transformed data, characterizing gene expression from patterns, and outputting to a computer and a user. None of said steps result in a physical transformation of matter.

Therefore, the claims must be evaluated for providing a practical application that produces a concrete, tangible and useful result. The focus is not on the steps taken to achieve a particular result, but rather the final result achieved by the claimed invention. A claim may be statutory where it recites a result that is concrete (i.e. reproducible), tangible (i.e. communicated to a user), and useful (i.e. a specific and substantial). In the instant case, claim 1 encompasses claim embodiments that does not recite a tangible result such that it is useful to one skilled in the art. The step of “outputting said characterization to a computer”, does not provide a tangible result that is useful to one skilled in the art. Rather, the instant claims could merely encompass *in silico* output, such that it is not available to a user. The tangible requirement does require that the claim must recite more than a 101 judicial exception, in that the process claim must set forth a practical application of that 101 judicial exception to produce a real-world result. Benson, 409 U.S. at 71-72, 175 USPQ at 676-77 (invention ineligible because no “substantial practical application.”). In the instant case, no real-world result is set forth.

Claims 17 and 23 are drawn to a computer system and an article of manufacture that do not meet the statutory requirement. In the instant claims the “program stored in a computer readable medium” or the “system”, constitute nonfunctional descriptive material, as no requisite functionality is present to satisfy the practical application requirement. Merely claiming nonfunctional descriptive material, i.e. abstract ideas, stored in a computer-readable medium, in

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a computer, does not make the claims statutory. Further, data structures, as in a "program" are descriptive material, *per se* and are not statutory because they are not capable of causing a functional change in the computer. See, e.g., Warmerdam, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure *per se* held nonstatutory). Computer programs are viewed as computer listings, *per se*, i.e., the description or expression of the programs, are not physical things. They are neither computer components nor statutory processes, as they are not "acts" being performed. Such claimed computer programs do not define any structural and functional interrelationships between the computer program and the other claimed elements of a computer that permit that computer program's functionality to be realized. Furthermore, while the claims may be directed to a product, *per se*, the computer system and program encompass method steps which are non-statutory and the method run by the products fails to produce a concrete, tangible and useful result. Without an "output" from the system or article of manufacture that is concrete, tangible or useful, such as output only to a user or display, the system and article of manufacture do not meet the statutory requirements,

It is noted that the embodiment of the claim reciting "outputting said characterization to a user" is statutory and meets the requirement under 35 USC 101.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 1-3, 17-19, 23-25, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,882,990 (Barnhill et al.; filing date of 7 August 2000), for the reasons set forth in the previous Office Action and re-iterated below..

The instant claims, as amended, are drawn to a method, system, and article of manufacture for characterizing gene expression comprising determining gene expression signals for a gene as control data and phenotype data; transforming the control data such that it has a uniform distribution, applying it to the phenotype data to get values; using the values to establish gene patterns through a pattern-finding algorithm; and characterizing the patterns.

The '990 patent discloses systems and methods for enhancing knowledge discovery using support vector machines (abstract). Specifically, in regard to claims 1, 17, and 23, '990 teaches preprocessing training data (fairly reading on "control data") sets such that flawed data are corrected (column 5, lines 17-20). The data consist of data generated from genomic and proteomic studies, for example, thus meeting the limitation of "gene expression" data (column 4, lines 17-29; outlining the gene expression data papers of Golub; Brown etc.). Test data are also preprocessed, as described at column 5, lines 45-49, reading on the limitation of a "phenotype data". The "preprocessing" of data includes transforming data using a plethora of means, as outlined at column 16, lines 45-67 to column 15, lines 1-19. Trained leaning machine algorithms are then applied to "unknowns" to establish patterns in the data (column 10, lines 57-61), thus meeting the limitations of the instant claims. Finally the patterns may be displayed, as also required by the claims (column 6, lines 31-32).

In regard to claims 2, 18, and 24, the '990 patent discloses that multiple samples may be analyzed, as disclosed by multiple learning machines (column 6, line 41). '990 also discloses changing the number of observations of an input point, thus expanding dimensionality, which could also be interpreted as "transforming an additional sample" (column 14, lines 23-27).

'990 does not specifically disclose transformation which includes transformation to a uniform distribution within an interval, as in claims 1, 17, 23, and 29, however, '990 teaches that the expansion of data may comprise applying any type of meaningful transformation to the data and that the criteria for doing so really depends upon the type of data and the knowledge sought from the data. Therefore, it would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to have utilized a transformation that included uniform

distribution in order that data analysis be optimized. One of skill in the art would have had reasonable expectation of success with such a technique, because '990 states that it would be reasonable to use any transformation technique. '990 outlines several, and states that the list is not exhaustive, rather other transformation may be used, as well as combination of transformation techniques (column 14, lines 65-67).

Response to Applicant's Arguments regarding Barnhill (US 6,882,990)

1. Applicant argues that Barnhill's "training data" does not read on or suggest "control data" of the presently claimed invention, nor does Barnhill's "test data" read on or suggest "phenotype data" of the presently claimed invention. Applicant states that "the present specification states that the present invention is used to take an initial set of expression data from one phenotype (generally called the control set and containing information from healthy cells). Applicant asserts that the present specification states that "the transformation are applied to a set of expression data from another phenotype (generally called the phenotype set and containing information from unhealthy cells". Applicant states that "Barnhill does not teach or suggest the concept of phenotype".

This is not persuasive. Barnhill ('990) discloses a method and system for using a learning machine and support vector machine (svm) for diagnosing and prognosing changes in biological systems, such as diseases. The method is generally applicable to a variety of biological data, including data from tissue samples of disease and healthy individuals (column 9, Fig. 26, 30, 33; column 10, lines 36-51; column 12, lines 34-36; column 13, lines 21-39). Therefore, the "data" of Barnhill is data relating to phenotype of an organism or tissue from a

healthy cell or unhealthy cell and the data that is used for the “control” and “test” data come from such biological information. The transformation and expansion of data is relative to the data that is “input” into the system and the criteria for determining if the transformation is meaningful in the context of the data is dependent upon the knowledge sought (column 14, lines 40-67). The claims remain rejected as obvious over Barnhill for at least the reasons set forth above.

Conclusion

No claims are allowed.

The outstanding rejections under 35 USC 112, 2nd paragraph have been withdrawn in view of the claim amendments.

Inquiries

Papers related to this application may be submitted to Technical Center 1600 by facsimile transmission. Papers should be faxed to Technical Center 1600 via the PTO Fax Center. The faxing of such papers must conform with the notices published in the Official Gazette, 1096 OG 30 (November 15, 1988), 1156 OG 61 (November 16, 1993), and 1157 OG 94 (December 28, 1993) (See 37 CFR § 1.6(d)). The Central Fax Center Number is (571) 273-8300.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lori A. Clow, Ph.D., whose telephone number is (571) 272-0715. The examiner can normally be reached on Monday-Friday from 10 am to 6:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Marjorie Moran can be reached on (571) 272-0720.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to (571) 272-0547.

Patent applicants with problems or questions regarding electronic images that can be viewed in the Patent Application Information Retrieval system (PAIR) can now contact the USPTO’s Patent Electronic Business Center (Patent EBC) for assistance. Representatives are available to answer your questions daily from 6 am to midnight (EST). The toll free number is (866) 217-9197. When calling please have your application serial or patent number, the type of document you are having an image problem with, the number of pages and the specific nature of

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the problem. The Patent Electronic Business Center will notify applicants of the resolution of the problem within 5-7 business days. Applicants can also check PAIR to confirm that the problem has been corrected. The USPTO's Patent Electronic Business Center is a complete service center supporting all patent business on the Internet. The USPTO's PAIR system provides Internet-based access to patent application status and history information. It also enables applicants to view the scanned images of their own application file folder(s) as well as general patent information available to the public.

June 5, 2008

/Lori A. Clow, Ph.D./

Primary Examiner, Art Unit 1631